AF

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: **DUANE Q. HUYNH**	§	Attorney Docket No.: **SJO920010065US1**
Serial No.: **09/943,246**	§	Examiner: **TIANJIE CHEN**
Filed: **30 AUGUST 2001**	§	
For: **ACTUATOR ARM DESIGN FOR REDUCING POWER CONSUMPTION IN A DISK DRIVE DATA STORAGE DEVICE**	§	Art Unit: **2652**

APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in response to the Final Office Action, dated December 29, 2004, in triplicate in support of the Appeal in the above-identified application. Please charge **Hitachi Global Storage Technologies Deposit Account No. 50-2587** the amount of **$500.00** for the Appeal Brief fee. In the event an additional fee is required, please charge that fee to **Hitachi Global Storage Technologies Deposit Account No. 50-2587**.

CERTIFICATE OF MAILING
37 CFR 1.8(A)

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to Mail Stop Appeal Brief – Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Betty J. Kirk — January 21, 2005
Date

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REAL PARTY IN INTEREST

The Real Party in Interest in the present Appeal is International Business Machines Corporation, the assignee, as evidenced by the assignment set forth at Reel 012146, Frame 0781.

RELATED APPEALS AND INTERFERENCES

No related appeals or interferences are known to Appellant, Appellant's legal representative, or assignee, which will directly affect, or be directly affected by, or have a bearing on the Board's decision in the present Appeal.

STATUS OF THE CLAIMS

Claims 1 – 3 and 5 - 13 stand finally rejected by the Examiner as confirmed in the Final Office Action, dated December 29, 2004, and are on appeal.

STATUS OF THE AMENDMENTS

No Amendment was entered subsequent to the Final Office Action.

SUMMARY OF THE INVENTION

As shown in Figures 1 - 4, Appellant's invention comprises a hard disk drive actuator arm that significantly reduces air flow drag within the drive. Page 6, lines 25 - 26. The leading and trailing edges of the arm are shaped to reduce their coefficient of air flow drag in order to reduce the running current and seeking current of the disk drive during operation. Page 6, lines 5-8 and 27 - 28. One feature of the present invention is that the leading and trailing edges are not only aerodynamic, but they are also tapered at their respective ends. Page 6, lines 13 – 14. In addition, the leading and trailing edges extend all the way from the pivot assembly aperture to the suspension tongue. Page 6, lines 15 – 16. The weight-reducing apertures located in the interior of the actuator arm also have aerodynamic profiles. Page 6, lines 21 – 23.

ISSUE

Is the Examiner's rejection of Claims 1 – 3, 5, 7 – 9, and 11 - 13 under 35 U.S.C. § 102(b) as being anticipated by *Peterson*, and Claims 6 and 10 under 35 U.S.C. § 103(a) as being unpatentable over *Peterson* in view of *Williams* well founded?

GROUPING OF THE CLAIMS

For purposes of this appeal, Claims 1 – 3 stand or fall together as a first group, Claims 5 and 7 – 9 stand or fall together as a second group, Claims 6 and 10 stand or fall together as a third group, and Claims 11 -13 stand or fall together as a fourth group.

ARGUMENTS

There are at least three elements of the present invention that are distinguishable over the prior art: (1) the leading and trailing edges are tapered at their respective ends; (2) the leading and trailing edges extend all the way from the pivot assembly aperture to the suspension tongue; and (3) the weight-reducing apertures located in the interior of the actuator arm have aerodynamic profiles. Appellant will differentiate each of these features with respect to the prior art in the following paragraphs.

The *Peterson* reference

With respect to item (1) (i.e., tapered ends), the cited prior art reference, *Peterson*, clearly shows in its Figures 1, 2, and 3 that its sides 132 abruptly end as squared-off or flat edges—they are not tapered. For example, in Figure 1 (top view), the four ends (not numbered) of the two sides 132 are visibly perpendicular to their respective lengths. In Figures 2 and 3, the flat distal ends (i.e., arrowheads) of each side 132 are clearly visible. If the ends of *Peterson* were tapered like the present invention, it would be impossible to see the arrowhead shapes in Figure 2, or the various "C-channel" shapes 230, 233 shown in Figure 3. In other words, the cross-sectional shapes illustrated in the middle of the sides 226 (Figures 4-6) are the same as they are on the

ends (Figure 3). If the ends were tapered, no such C-channel shapes would be visible. Compare Appellant's smooth and rounded tapered ends 145, 147, 151 (Figure 4) to those of *Peterson.*

Moreover, the Examiner is attempting to use the singular, cross-sectional shape of *Peterson's* leading and trailing edges to satisfy two elements of Appellant's claims, namely, both as "aerodynamic profiles" and as "tapered." Page 2, paragraph 1, last sentence ("the leading and trailing [sic] are tapered along the whole length including the respective ends"). Appellant adamantly maintains that the Examiner can try to characterize the length of *Peterson's* edges as aerodynamic or tapered, but not both. If the cross-sectional shape of *Peterson's* edges never changes, how can it satisfy two elements? Even if *Peterson's* edges satisfy one element (aerodynamic), the cross-sectional shape never changes so they cannot then be used to satisfy a second element (tapered). In contrast, the cross-sectional profile of Appellant's edges actually changes along their lengths because they are tapered at the ends. A cross-sectional view between the ends of Appellant's edges looks completely different from a cross-sectional view at the ends.

With regard to item (2) (i.e., side edges extend from pivot to tongue), *Peterson* again falls short (literally). As best shown in *Peterson's* Figure 1, neither the left side 132 nor the right side 132 extends all the way to the tongue 116. They terminate prior to reaching the tongue about halfway into the central, trapezoidal aperture. Moreover, only the right side 132 extends to the pivot 112. The left side 132 clearly terminates about half-way to pivot 112 (near the end of the large, rear trapezoidal aperture) to provide ample room for the attachment of cable 124. The left side 132 is less than half as long as the right side 132--how can they both extend "all the way" to the pivot 112? The left side 132 is *too short.* Perhaps the Examiner is confused that the long, thin, rectangular end of cable 124 (shown in Figure 1) attached to the actuator 110 is part of left side 132. Figure 2 makes it clear that left side 132 is much shorter than right side 132. In contrast, Appellant's Figure 4 clearly shows full extension of sides 141, 143 all the way from pivot 153 to tongue 155.

The *Williams* reference

Finally, with regard to item (3) (i.e., aerodynamic apertures), the other cited reference (*Williams*) clearly shows flat, non-aerodynamic side walls 59 in its internal aperture (Figures 4, 6, and 8) that are completely orthogonal to top surface 116. The side walls 59 are parallel to the flat external side walls 64, have the same thickness as the overall thickness of the arms, and therefore do not have an aerodynamic profile—this is completely typical prior art. The Examiner cites *Williams'* column 7, lines 14-18, to suggest otherwise. Page 4, paragraph 2. However, careful inspection of this text reveals that the "taper" refers to the narrowing of the arms *when viewed from above* (i.e., "from the proximal section 54 to the distal section 56") along the length of the arm 18. Col.7, lines 7-8. The range of angles (i.e., "eight to twenty degrees") specified by *Williams* verifies this interpretation. Col.7, line 11. In no way can this language be construed as representing an aerodynamic reshaping of the inner side walls 59 of the aperture formed between the sides 60, 62 of the arm 18.

Appellant's Claims

Accordingly, the claims emphasize one or more of the at least three distinguishing features of the present invention. For example, Claim 1 requires element (1), namely, "the leading and trailing edges are tapered at their respective ends." As stated above, *Peterson's* sides 132 have flat, perpendicular ends and are not both tapered and aerodynamic—at best it's one or the other. If the ends of *Peterson* were tapered like the present invention, it would be impossible to see the arrowhead shapes in Figure 2, or the various "C-channel" shapes 230, 233 shown in Figure 3. Thus, Claim 1 and its dependent claims are clearly distinguishable over the prior art and in condition for allowance.

Claim 5 requires that "each of the leading and trailing edges extends from the pivot assembly aperture to a suspension tongue," which is element (2). Since neither *Peterson's* left side 132 nor right side 132 extends all the way to the tongue 116, and only right side 132 extends

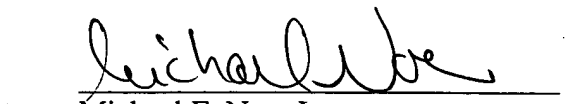
to the pivot 112, this element is not satisfied by *Peterson*. Independent Claim 7 and its dependent claims also require element (2) so that the leading edge and the trailing edge have aerodynamic profiles with triangular cross-sectional shapes "that extend from the pivot assembly aperture to the suspension tongue." Claim 7 is allowable for the same reasons as Claim 5.

Claims 6 and 10 recite element (3): "the aperture has an aerodynamic profile." In contrast, *Williams* has flat side walls 59 in its internal aperture that do not have an aerodynamic profile. The only taper shown and described in *Williams* is the (prior art) one along the length of its arm 18.

Finally, independent Claim 11 and its progeny contain all three elements (1), (2), and (3), which makes them easily distinguishable over the prior art for all of the foregoing reasons.

Since the Examiner has provided no suggestion or teaching for one skilled in the art to modify any combination of these references to remove either of these detrimental elements. For these reasons, it is respectfully urged that the claims are in condition for allowance and favorable action is requested.

Respectfully submitted,



Michael E. Noe, Jr.
Reg. No. 44,975
BRACEWELL & PATTERSON, L.L.P.
P.O. Box 61389
Houston, Texas 77208-1389
(512) 472-7800

ATTORNEY FOR APPELLANTS

APPENDIX

1. An actuator for a data storage device, comprising:

an actuator comb having a pivot assembly aperture and an actuator arm;

a leading edge on the actuator arm;

a trailing edge on the actuator arm;

the leading edge and the trailing edge have aerodynamic profiles for reducing a coefficient of air flow drag for the actuator arm; and

the leading and trailing edges are tapered at their respective ends.

2. The actuator of claim 1 wherein the leading and trailing edges are symmetrical.

3. The actuator of claim 1 wherein the leading and trailing edges have triangular cross-sectional shapes.

5. The actuator of claim 1 wherein each of the leading and trailing edges extends from the pivot assembly aperture to a suspension tongue.

6. The actuator of claim 1, further comprising a weight-reducing aperture located in an interior of the actuator arm, wherein the aperture has an aerodynamic profile for reducing a coefficient of air flow drag for the actuator arm.

7. An actuator for a data storage device, comprising:

an actuator comb having a pivot assembly aperture, a suspension tongue, an actuator arm there between, and leading and trailing edges on the actuator arm, wherein the leading and trailing edges extend from the pivot assembly aperture to the suspension tongue; and wherein

the leading edge and the trailing edge have aerodynamic profiles with triangular cross-sectional shapes that extend from the pivot assembly aperture to the suspension tongue for reducing a coefficient of air flow drag for the actuator arm.

8. The actuator of claim 7 wherein the leading and trailing edges are symmetrical.

9. The actuator of claim 7 wherein the leading and trailing edges are tapered at their respective ends.

10. The actuator of claim 7, further comprising a weight-reducing aperture located in an interior of the actuator arm, wherein the aperture is circumscribed with an aerodynamic profile for reducing a coefficient of air flow drag for the actuator arm.

11. A hard disk drive, comprising:

a housing;

a spindle motor assembly mounted to the housing and having a central drive hub;

a data storage disk mounted to the spindle motor assembly;

a pivot assembly mounted to the housing;

an actuator mounted to the pivot assembly for movement relative to the disk, the actuator having a voice coil, an arm with a suspension mounted thereto, a read/write head on the suspension;

a leading edge on the arm;

a trailing edge on the arm;

the leading and the trailing edges have aerodynamic profiles for reducing a coefficient of air flow drag for the arm, the leading and trailing edges are tapered at their respective ends, and each of the leading and trailing edges extends from the pivot assembly to the suspension; and

weight-reducing apertures in the arm, wherein each of the apertures is circumscribed with an aerodynamic profile for reducing a coefficient of air flow drag for the actuator arm.

12. The hard disk drive of claim 11 wherein the leading and trailing edges are symmetrical.

13. The hard disk drive of claim 11 wherein the leading and trailing edges have triangular cross-sectional shapes.